

# **INDIANA ROADSIDE OBSERVATION SURVEY OF SAFETY BELT USE AND MOTORCYCLE HELMET USE**

**June 2003**

**Carolyn S. Bridge**

**Maria L. Drake**

**Jennifer M. Howells**

**Jose E. Thomaz**

**Robert C. Zahnke**

**Center for the Advancement of Transportation Safety  
Room 322 Potter Engineering, 500 Central Drive  
Purdue University  
West Lafayette, IN 47907**

**Prepared for:  
Indiana Governor's Council on Impaired & Dangerous Driving,  
A division of the Indiana Criminal Justice Institute  
Office of Traffic Safety  
One North Capitol, Suite 1000  
Indianapolis, IN 46204**

**Submitted: October 29, 2003**

---

## 1.0 Executive Summary

A roadside observation survey of safety belt use and motorcycle helmet use in Indiana was conducted in June 2003. Purdue University's Center for the Advancement of Transportation Safety (CATS) designed the survey, trained the observers, and performed the data entry and analysis. Staff members from the Governor's Council on Impaired & Dangerous Driving, Indiana's Law Enforcement Liaisons and staff members from CATS collected the observations. The Governor's Council on Impaired & Dangerous Driving, Indiana Criminal Justice Institute provided funding for the project using funds received from the National Highway Traffic Safety Administration (NHTSA).

---

### 1.1 2003 Results

The seat belt usage rate for all passenger vehicles rose by 10.1 percent.

The 2003 "all passenger vehicle" safety belt usage rate established a new high for Indiana. The weighted usage rate for front-seat outboard occupants of all passenger vehicles increased from 72.2 percent in June 2002, to 82.3 percent during the 2003 survey period.

The seat belt usage rate for pickup trucks was 56.6 percent, continuing to be much lower than other passenger vehicles.

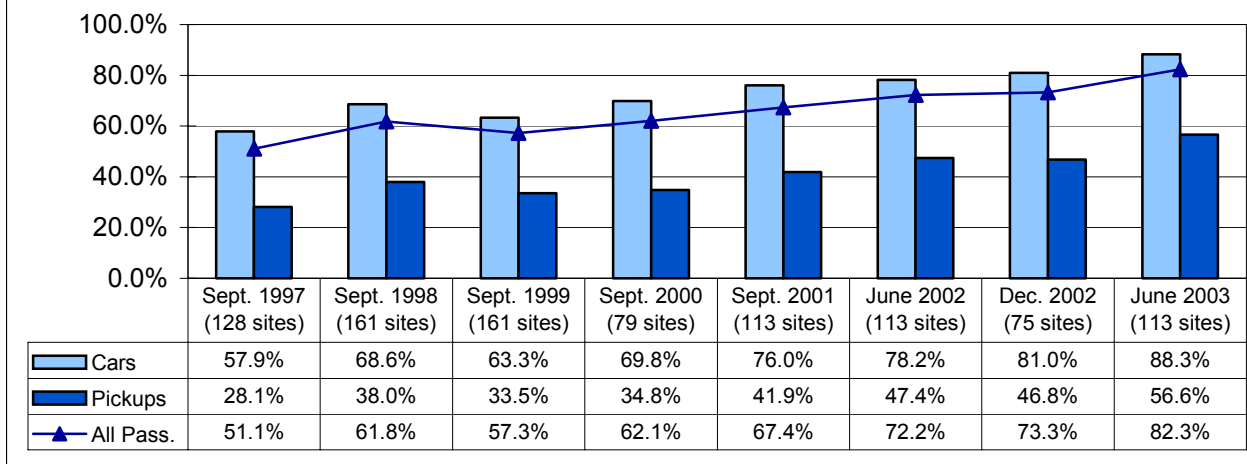
The passenger car usage rate (88.3 percent) also exceeded the previously high rate of 78.2 percent attained in 2002. Similarly, high usage rates were observed for both minivans (91.0) and sport utility vehicles (SUVs) (87.3 percent). Although pickup trucks continue to be exempt from the Indiana Occupant Protection Law, seat belt usage rates in these vehicles increased from 47.4 percent in 2002, to 56.6 percent in 2003. Unfortunately, the continued low seat belt usage rate by pickup truck occupants negatively affected the overall usage rate, as pickup trucks represented approximately 18.8 percent of the vehicles observed.

Seat belt usage rates in all passenger vehicles increased on all road classes in both rural and urban areas. Rural freeways had the highest usage rate of any roadway classification at 85.7 percent. The lowest usage rate was 77.0 percent on rural local roads. The greatest improvements were made on rural collector roads from a June 2002 result of 61.2 percent to a June 2003 result of 78.7 percent.

Female drivers continued to demonstrate higher usage rates (89.8 percent) than male drivers (76.4 percent).

Female drivers continued to demonstrate higher usage rates (89.8 percent) than male drivers (76.4 percent). Last year, older ( $\geq 22$  years of age) male drivers of pickup trucks demonstrated the lowest usage rates at 42.5 percent, but improved to 54.2 percent in 2003. Young ( $< 22$  years of age) male drivers of pickup trucks posted the lowest numbers for restraint use at 51.0 percent. A large discrepancy between age groups occurred with older and younger female pickup drivers. The usage rate in pickup trucks for young female drivers was 56.3 percent, while older female drivers achieved a 69.9 percent usage rate.

**Figure 1: Safety Belt Usage September 1997- June 2003 (Weighted)**



## 2.0 Survey Design

### 2.1 Introduction and History

The 2003 Indiana Roadside Observation Survey of Safety Belt Use was the twenty-ninth in a series of surveys originally designed in 1985. The first through seventeenth surveys (1986 through 1993) were all conducted using a common protocol. In 1994, the survey was redesigned in conformance with guidelines published in the *Federal Register* [vol. 57, no. 125, June 2, 1992: 2889928904] by the NHTSA; the revised design was discussed in the 1994 report. A review of the 1994 survey design was conducted prior to the 1998 survey for all states through the NHTSA regional offices. For 1994 and earlier surveys, reporting was confined to passenger cars. In 1995, the survey was modified to permit reporting for a wider variety of vehicle types, including minivans, sport-utility vehicles and pickup trucks. Large passenger vans were included for the first time in the 1998 survey as required by new NHTSA regulations. The Spring 2000, 103-site survey used a proportional, random sample of the sites used for the 1998 and 1999 survey. All vehicles identified as commercial have been excluded in each of the surveys through the 2000 survey. For the first time, the 2001 survey included commercial vehicles, with the exception of semi-tractor trailers and other large trucks with a gross vehicle weight greater than 10,000 pounds. The 2002 and 2003 surveys did not introduce any further protocol changes.

Since NHTSA permits states to exclude counties comprising up to 15 percent of the total population from their surveys, it was decided to examine the degree to which Indiana's weighted usage rates would be affected if exclusion of low population counties were exercised. The 2000 US Census Bureau estimates for Indiana county populations were used to rank-order Indiana counties by

population to determine the cumulative percents of total population. Eight of the surveyed counties (Perry, Fountain, Tipton, Newton, Decatur, Ripley, Daviess and Franklin) fell into the lowest population counties that could be excluded. This reduced the total number of sites by 24 to 79 sites. Appropriate VMT weights were calculated for exclusion of the eight low-population counties.

The NHTSA-approved design for reporting Indiana's year 2000 usage rates employed these 79 sites and grouped the 16 counties represented into two groups (8 urban and 8 rural counties). NHTSA also approved the collapsing of local and collector roads by urban/rural locale into one rural category and one urban category for analysis purposes.

Prior to the September 2001 survey, a thorough analysis of the current survey design was conducted. As a result, it was recommended that the number of sites be increased in selected areas. Areas identified for the increase fell into two general categories. First, the larger cities' and counties' sites were increased to better represent their population impact on the entire state survey. Second, road classifications that historically exhibit a wider range of variation for seat belt usage rates in the observational results were also increased. These modifications were submitted to NHTSA for their review and subsequent acceptance. The approved survey modifications increased the number of sites from 79 to 113, while continuing to exclude the lowest 15 percent population counties from the survey design.

The 113 sites were clustered into logical day trips and randomly assigned a start time and day of the week. Observations were collected on all days of the week. The collection day and time used in 1998 through 2000 for existing sites were retained whenever feasible. When scheduling constraints dictated a change in time or day, the proportion of sites assigned to weekend days, morning rush, evening rush and midday time periods was maintained. Observation sessions were evenly distributed during daylight hours (the time period between 6:30 AM and 6:30 PM). For the June 2003 survey, traffic was observed for exactly 45 minutes at each of the sites (the same observation protocol used in September 2000 and September 2001). Seat belt use was recorded for front-seat outboard occupants only (driver and right front passenger, if present). The formulas used to estimate usage rates, standard deviations and relative precision for the 2003 survey can be found in the 1998 report.

---

## **2.2 June 2003 Survey Design**

Commercial vehicle observations that were collected for the first time in the September 2001 survey were continued in 2003, using the same protocols as in previous years. In this year's report, Table 2 includes the reported results both with and without commercial vehicle observations. Because commercial vehicles are typically not passenger cars and the occupants are not required to use seat belts in Indiana, their inclusion would lower the overall reported results for the state.

The following counties (number of sites) were represented in the 2001, 2002 and 2003 surveys.

Allen (9)	Clark (4)	Clinton (2)	DeKalb (2)
Elkhart (7)	Gibson (4)	Hamilton (6)	Hancock (5)
Hendricks (5)	Henry (3)	Howard (5)	Jackson (6)
Lake (10)	LaPorte (8)	Marion (8)	Marshall (4)
Morgan (1)	Porter (7)	Tippecanoe (6)	St. Joseph (3)
Vanderburgh (8)			

---

### 3.0 Survey Results

Observations were collected June 1–7, 2003. Usage rates were calculated based upon use of the shoulder harness by the drivers and front-seat outboard occupants. The observer designated “yes” on the observation form for all eligible occupants who were properly restrained. “No” was marked for occupants who were unrestrained or improperly restrained (shoulder harness behind his/her back). If the observer was unable to make a determination regarding the occupant’s restraint, “unknown” was recorded. All children located in the front seat occupying a child restraint seat were excluded from the counts due to the inability of observers to accurately determine restraint status.

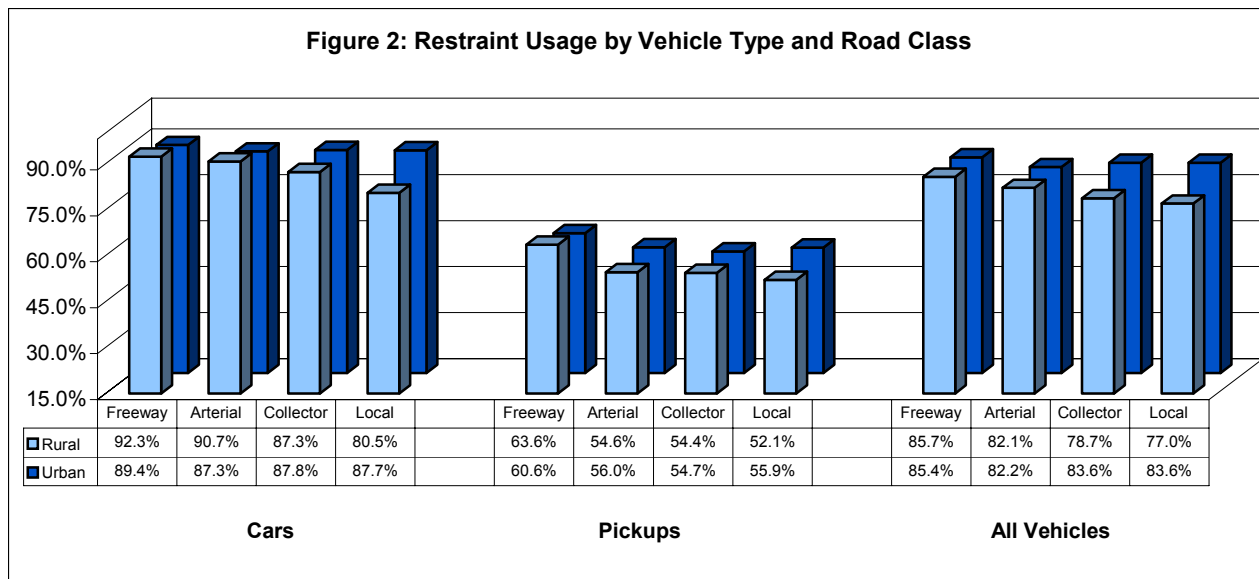
A total of 18,175 vehicles were observed, including 18,175 drivers and 4,321 eligible front-seat occupants.

A total of 18,175 vehicles were observed, including 18,175 drivers and 4,321 eligible front-seat occupants, for a total of 22,496 occupant observations. There were 21,020 occupant observations in the 2002 survey. This represents a 7.0 percent increase in the number of observations. The 2002 and 2003 surveys were comprised of the same 113 sites.

---

#### 3.1 *Restraint Usage by Roadway Class*

Indiana roadways are divided into eight functional road classifications. For the purpose of seat belt survey calculations, roads are classified as freeways (interstates), arterial, collector and local roads. Each of these four classifications is then labeled as either rural or urban areas. The 2002 survey results measured the lowest usage rates (34.9 percent) on rural collector roads for occupants of pickup trucks. The highest percentage of seat belt use observed was for occupants of passenger cars traveling on urban freeways at 80.5 percent. In 2003, the survey’s lowest usage rates were recorded on rural local roads for occupants of pickup trucks (52.1 percent), while the highest rates were observed on rural freeways for occupants of passenger cars (92.3 percent).



Increases were recorded on all road types by all vehicles since the 2002 survey. Occupants of pickup trucks on rural freeways displayed the largest increase at 23 percent reaching a usage rate of 63.6 percent in the 2003 survey. Although promising increases have been achieved, rural local roads continue to have low usage rates and show the greatest room for improvement. Changing the primary law to include pickup trucks would have the greatest impact on increasing belt usage rates across all road types.

### 3.2 Restraint Usage by Vehicle Type

Minivans had the highest overall usage rate for all occupants at 91.0 percent.

In 2002, minivans represented the highest overall seat belt usage rate for all occupants at 81.6 percent. Still ranked the highest in the 2003 survey, the usage rate for all occupants of minivans was 91.0 percent. Unweighted usage rates for passenger cars increased from 77.4 percent in 2002 to 88.5 percent in 2003, and SUVs experienced an 8.9 percent increase (from 78.4 percent to 87.3 percent). Between the 2001 and the 2002 surveys, there was a 2.1 percent increase in restraint use among the typically higher restraint usage rate vehicles (cars, minivans and SUVs). There was a 10.4 percent increase (to 88.6 percent) from the 2002 survey to the 2003 survey for those same vehicles. The typically lower restraint usage rate vehicles (pickup trucks and large vans) experienced a 2.6 percent increase between the 2001 and 2002 surveys, and a 15.0 percent increase to 58.0 percent in the 2003 survey.

### 3.3 Restraint Usage by Gender and Role

Traditionally, female drivers and passengers have had higher observed restraint usage rates than their male counterparts. A 13.0 percent difference was recorded between the genders in 2003. The female usage rate increased by 10.8 percent to 89.3 and the male usage rate had an 11.5 percent increase to 76.3 percent. The

The lowest usage rate persists among male passengers riding in

highest usage rate was found among female passengers of minivans (93.6 percent). The lowest usage rate was found among male passengers of pickup trucks (53.1 percent). The greatest increase from the 2002 survey was seen in female occupants of pickup trucks. The usage rate in 2002 was 55.6 percent and increased by 14.4 percent to 70.0 percent in 2003. This is a notable increase considering the pickup truck is still exempt from the primary law. Male occupants continue to pull down the overall results for Indiana with a driver usage rate of 76.4 percent and a passenger usage rate of 75.5 percent.

**Table 2: Indiana June 2003 Unweighted Restraint Usage  
by Vehicle Type, Gender and Role**

Vehicle Type	All Drivers				Front-Seat Passengers				Both
	R	NR	U	Percent Restrained	R	NR	U	Percent Restrained	Percent Restrained
Cars	5,083	656	19	88.6%	1,268	168	24	88.3%	88.5%
Pickup Trucks	1,182	911	24	56.5%	260	171	9	60.3%	57.1%
Minivans	1,046	111	2	90.4%	361	28	3	92.8%	91.0%
Large Vans	159	86	2	64.9%	40	18	2	69.0%	65.7%
SUV	1,420	207	13	87.3%	331	48	8	87.3%	87.3%
Commercial	200	151	1	57.0%	25	22	0	53.2%	56.5%
<b>All Vehicles</b>	<b>9,090</b>	<b>2,122</b>	<b>61</b>	<b>81.1%</b>	<b>2,285</b>	<b>455</b>	<b>46</b>	<b>83.4%</b>	<b>81.5%</b>
<b>Without Commercial Vehicles</b>	<b>8,890</b>	<b>1,971</b>	<b>60</b>	<b>81.9%</b>	<b>2,260</b>	<b>433</b>	<b>46</b>	<b>83.9%</b>	<b>82.3%</b>

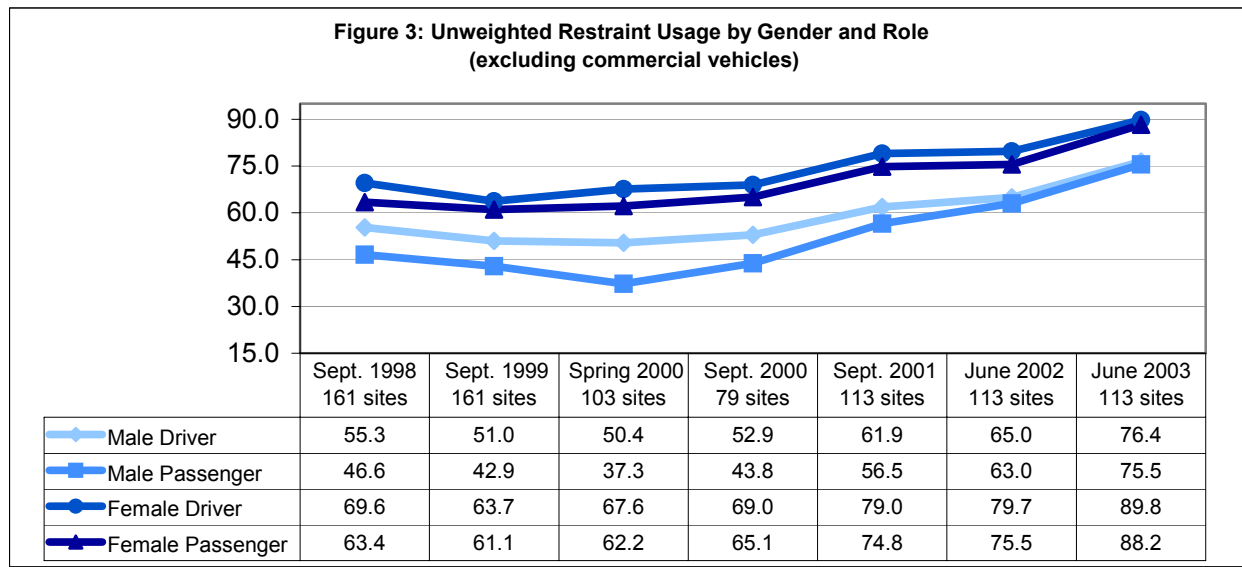
Vehicle Type	Female Drivers				Female Front-Seat Passengers				Both
	R	NR	U	Percent Restrained	R	NR	U	Percent Restrained	Percent Restrained
Cars	2,473	272	4	90.1%	865	82	14	91.3%	90.4%
Pickup Trucks	175	64	1	73.2%	142	72	7	66.4%	70.0%
Minivans	531	38	0	93.3%	265	18	1	93.6%	93.4%
Large Vans	48	9	1	84.2%	19	7	1	73.1%	80.7%
SUV	686	61	0	91.8%	232	25	5	90.3%	91.4%
Commercial	13	9	0	59.1%	4	0	0	100.0%	65.4%
<b>All Vehicles</b>	<b>3,926</b>	<b>453</b>	<b>6</b>	<b>89.7%</b>	<b>1,527</b>	<b>204</b>	<b>28</b>	<b>88.2%</b>	<b>89.2%</b>
<b>Without Commercial Vehicles</b>	<b>3,913</b>	<b>444</b>	<b>6</b>	<b>89.8%</b>	<b>1,523</b>	<b>204</b>	<b>28</b>	<b>88.2%</b>	<b>89.3%</b>

Vehicle Type	Male Drivers				Male Front-Seat Passengers				Both
	R	NR	U	Percent Restrained	R	NR	U	Percent Restrained	Percent Restrained
Cars	2,586	383	5	87.1%	378	84	8	81.8%	86.4%
Pickup Trucks	1,001	847	10	54.2%	111	98	0	53.1%	54.1%
Minivans	514	73	2	87.6%	94	10	2	90.4%	88.0%
Large Vans	111	77	1	59.0%	20	11	0	64.5%	59.8%
SUV	730	146	6	83.3%	94	23	2	80.3%	83.0%
Commercial	187	142	1	56.8%	21	22	0	48.8%	55.9%
<b>All Vehicles</b>	<b>5,129</b>	<b>1,668</b>	<b>25</b>	<b>75.5%</b>	<b>718</b>	<b>248</b>	<b>12</b>	<b>74.3%</b>	<b>75.3%</b>
<b>Without Commercial Vehicles</b>	<b>4,942</b>	<b>1,526</b>	<b>24</b>	<b>76.4%</b>	<b>697</b>	<b>226</b>	<b>12</b>	<b>75.5%</b>	<b>76.3%</b>

Legend: R= Restrained; NR=Not Restrained; U=Unknown Restraint; SUV=Sport Utility Vehicles

Figure 3 illustrates the historical results from 1998 through the most recent survey for both gender and role (driver or passenger) of the observed occupant. The 2003 survey shows some strong improvements for all categories. The greatest increase was recorded for female passengers (12.7 percent). As the female usage rate improves, it will become more difficult to convert the remaining belt nonusers. Male occupants continue to provide the greatest opportunity for improvement.



### 3.4 Restraint Usage by Age of Driver and Passengers

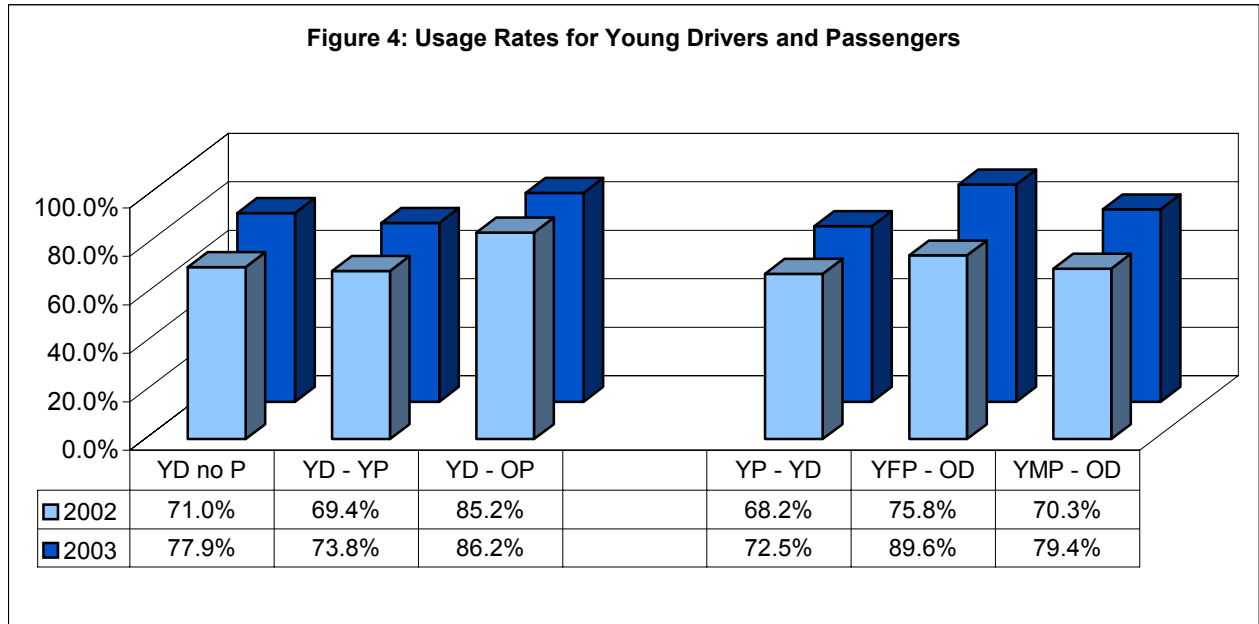
Young drivers without passengers had a usage rate of 77.9 percent, about 4.4 percent below the overall weighted average for the state.

Young female passengers displayed an increase of 12.7 percent from the 2002 survey.

The September 2000 survey report was the first in Indiana to compare seat belt use by driver age and the age of the front-seat outboard passenger, if present. The age of the driver and passenger is a determination based upon the field observer's best estimate and is subjective. An incorrectly categorized observation can positively or negatively impact the results. A driver is classified as young if he or she appears to be under the age of 21. Figure 4 graphically displays the 2003 results. The usage rate for young drivers without passengers was 77.9 percent, about 4.4 percent below the overall weighted average for the state. Young drivers accompanied by young passengers showed lower restraint rates, dropping to 73.8 percent. Young drivers with older passengers (older meaning estimated to be at least 22 years of age) had much higher usage rates (86.2 percent). Young female passengers riding with older drivers displayed even higher rates (89.6 percent) than young male passengers riding with older drivers (79.4 percent). Passengers of both genders have shown increases from the 2002 survey.

Increases were made in all possible categories for young drivers and young passengers. The advances made by young female passengers, who increased usage rates by 12.7 percent to 88.2 percent, were most notable. The lowest usage rates remain when young drivers and young passengers are together. This group

is particularly susceptible to peer pressure. The young drivers and passengers appear to be influenced by the actions of others in the vehicle as it relates to the proper usage of seat belts.



#### Legend

**YD - no P: Young Driver – no Passenger**  
**YD - YP: Young Driver – Young Passenger**  
**YD - OP: Young Driver – Older Passenger**  
**YP - YD: Young Passenger – with Young Driver**  
**YFP - OD: Young Female Passenger – with Older Driver**  
**YMP - OD: Young Male Passenger – with Older Driver**

Figure 5 displays the 2003 survey results by age and gender of pickup truck drivers and drivers of all other vehicles. Young males exhibited the lowest usage rates at 51.0 percent in pickup trucks and 75.3 percent in all other vehicle types. Young female drivers had slightly higher rates than older male drivers, but were still behind older females in all vehicle types. Excluding pickup trucks, older females reached a usage rate of 90.9 percent.

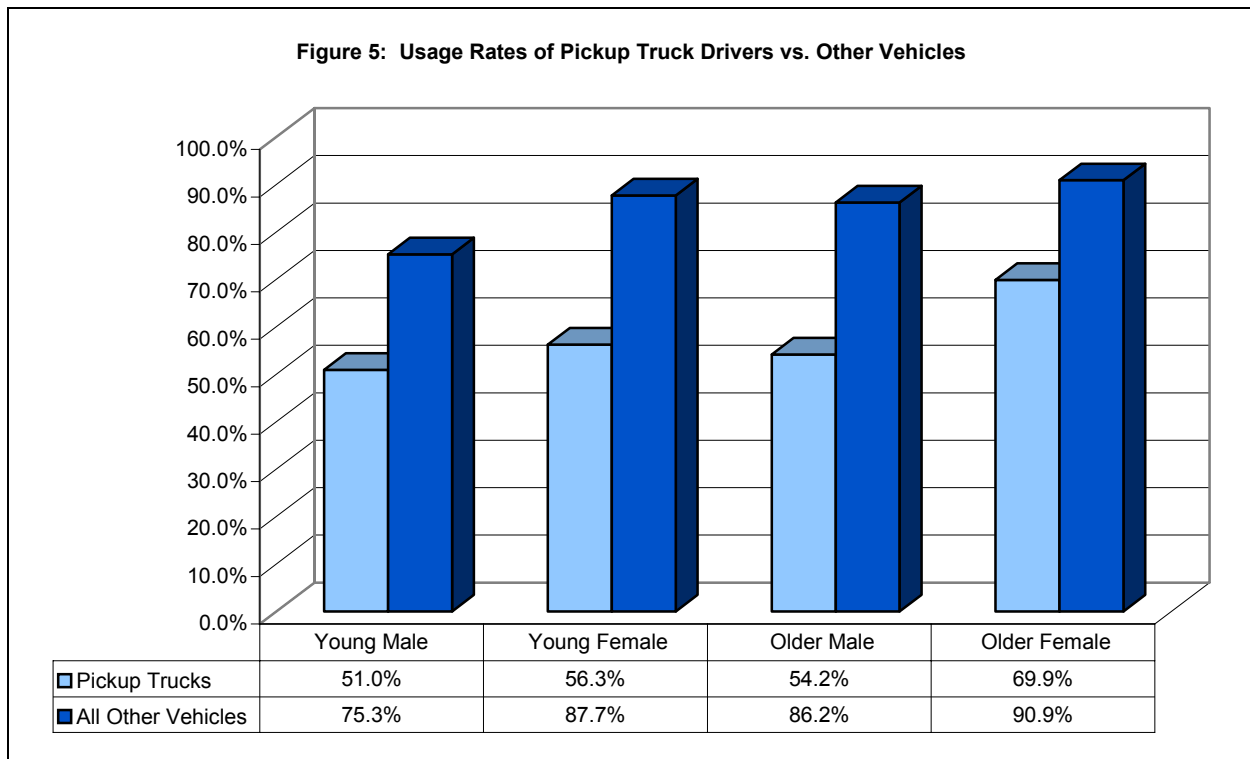
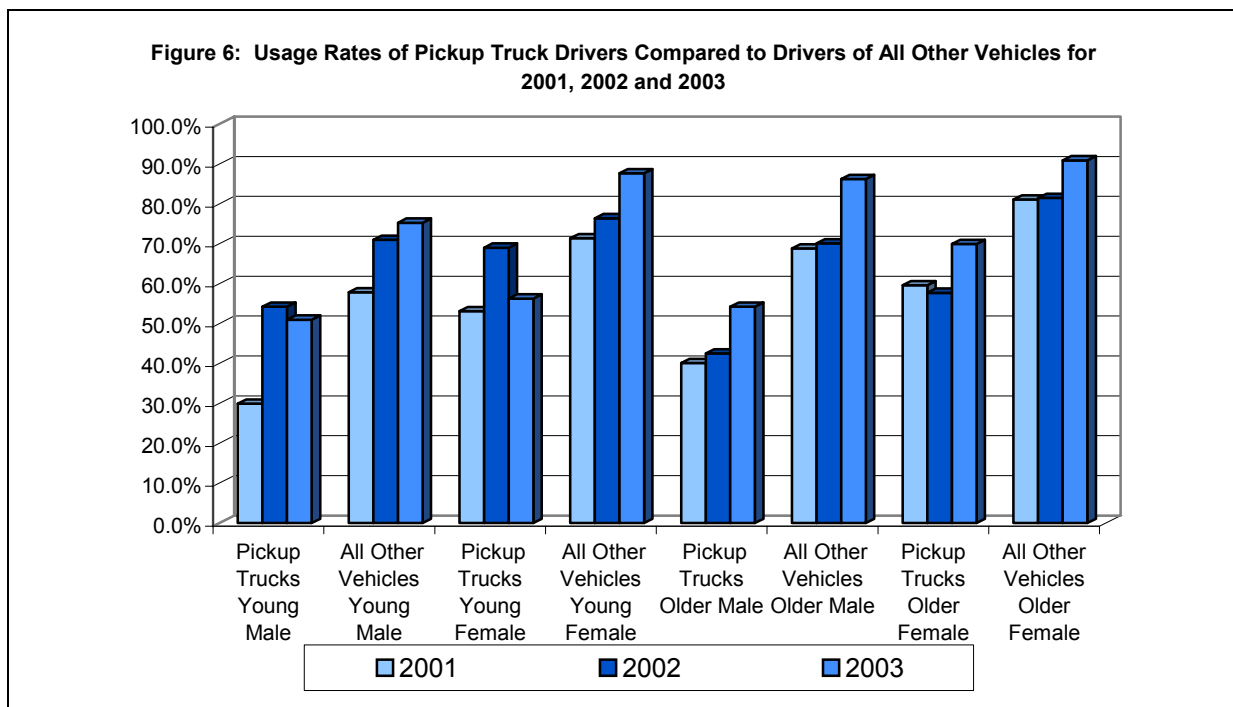


Figure 6 illustrates a comparison of the above results with the 2001 and the 2002 surveys.



Improvements in seat belt use have been made in each of the above areas with the exception of pickup trucks operated by young drivers. Young males were

observed to have a decrease in usage rates from the 2002 survey of 3.2 percent (to 51.0 percent) and young females had a decrease of 12.7 percent (to 56.3 percent).

---

### 3.5 *Motorcycle Helmet Usage Rates*

The overall motorcycle helmet usage rate for 2003 was 45.0 percent.

The overall helmet usage rate for 2003 was 45.0 percent, an increase from the 34.9 percent reported in 2002 and 32.8 percent reported in 2001. A total of 123 motorcycles were observed (123 drivers and 19 passengers). Motorcycle data was only collected during the assigned observation periods, not while in transit from one site to another as in some of the previous surveys. This change was made because of the difficulty of the observer accurately determining the correct road classification for those observations made on the transit roads. Only persons under the age of 18 are required to wear helmets while operating a motorcycle on Indiana streets or highways.

---

## 4.0 **Conclusions and Recommendations**

Analysis of the June 2003 observational survey results demonstrates increases in seat belt usage rates for drivers and front-seat outboard passengers in all areas as identified by vehicle type, roadway type, rural/urban locales and gender. At 82.3 percent, the statewide restraint usage rate has reached an all time high for Indiana. The state had a 10.1 percent increase in usage rates from the June 2002 survey, or a nonuser conversion rate of 36 percent. This percentage is based upon the NHTSA model and represents the decrease of nonusers of seat belts over the past year [*i.e.*,  $.3597 = (82.3 - 72.2) / (100 - 72.2)$ ].<sup>1</sup>

Older female drivers and occupants clearly display higher restraint usage rates than younger females and males of all ages. Female pickup truck drivers have increased usage rates from 59.4 percent in 2002 to 73.2 percent in 2003. Male pickup truck occupants continue to have the lowest usage rate (54.1 percent). More specifically, males under the age of 22 (by observer judgment) driving pickup trucks have the lowest usage rate at 51.0 percent. Increases in belt use among these populations would have a great impact on Indiana's usage rate.

The gap between seat belt usage rates in rural versus urban locales has decreased. Likewise, the gap that has historically existed between local/collector roads and major roads such as arterial roads and interstates also has narrowed, especially in urban areas. The usage rate on rural local roads (77.0 percent) continues to exhibit the greatest need for improvement.

Emphasis needs to continue to be on the passage of a primary law for pickup trucks in Indiana. (Note: the current Indiana law excludes pickup truck occupants from all seat belt usage requirements, including allowing unrestrained children (4+) to ride in the beds of pickup trucks or cargo areas of passenger vehicles, with the exception of requiring that a child under the age of four must be restrained).

---

<sup>1</sup> <http://www-nrd.nhtsa.dot.gov/departments/nrd-30/ncsa/AvialInf.html>

Indiana also needs to engage efforts focused on younger occupants. Young drivers and young passengers need to maintain proper seat belt use even in the absence of an older occupant.

The 10.1 percent increase in the weighted usage rates for passenger car occupants and the 9.2 percent increase in usage rates for pickup truck occupants since the 2002 survey is a step in the right direction, but there is still room for improvement. The 2002 data from the Indiana Bureau of Motor Vehicles counted just over 4,200,000 licensed drivers in Indiana. If the unweighted daily driver restraint usage rate of 80.9 percent observed in this survey is a true representation of Indiana drivers, one could infer that approximately 802,000 Hoosiers are potentially driving unrestrained each day. Considering there is a crash in Indiana every 2.4 minutes, the opportunity to save a number of these individuals from unnecessary injury is substantial. Increased efforts to boost usage rates of pickup truck occupants, male occupants and users of rural local roadways could push Indiana to the top of the primary law seat belt states.

---

## 5.0 References

Bridge, Carolyn S.; Drake, Maria L.; Thomaz, Jose E.; Zahnke, Robert C., "Roadside Observation Survey of Safety Belt Use in Indiana: June, 2002," Purdue University Center for the Advancement of Transportation Safety, June 2002.

Bridge, Carolyn S.; Drake, Maria L.; Thomaz, Jose E.; Zahnke, Robert C., "Roadside Observation Survey of Safety Belt and Motorcycle Helmet Use in Indiana: September, 2001," Purdue University Center for the Advancement of Transportation Safety, December 2001.

Besel, Ronald R.; Dennis, Carolyn S.; Drake, Maria L.; Stover, Clifford G. "Roadside Observation Survey of Safety Belt and Motorcycle Helmet Use in Indiana: September, 2000-Final Results," Purdue University Center for the Advancement of Transportation Safety, December 2000.

Besel, Ronald R.; Dennis, Carolyn S.; Drake, Maria L.; Stover, Clifford G. "Roadside Observation Survey of Safety Belt Use in Indiana: Spring, 2000," Purdue University Center for the Advancement of Transportation Safety, August 2000.

Besel, Ronald R.; Dennis, Carolyn S.; Drake, Maria L.; Stover, Clifford G.; Thomaz, Jose E. "Roadside Observation Survey of Safety Belt and Motorcycle Helmet Use in Indiana: September 1999," Purdue University Automotive Transportation Center, January 2000.

Besel, Ronald R.; Caldanaro, Richard; Haley, Mary; Thomaz, Jose. "Roadside Observation Survey of Safety Belt and Motorcycle Helmet Use in Indiana: September 1998," Purdue University Automotive Transportation Center, April 1999.

Mitter, Eric L.; James, Dwayne S.; Cornwell, J. Philip; Besel, Ronald R. "Roadside Observation Survey of Safety Belt and Motorcycle Helmet Use in Indiana: August 1994," Indiana University Transportation Research Center and Purdue University Automotive Transportation Center, November 1994.